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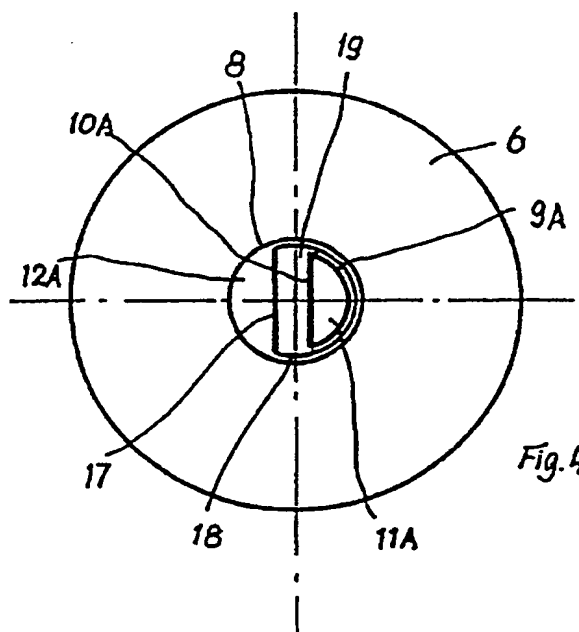
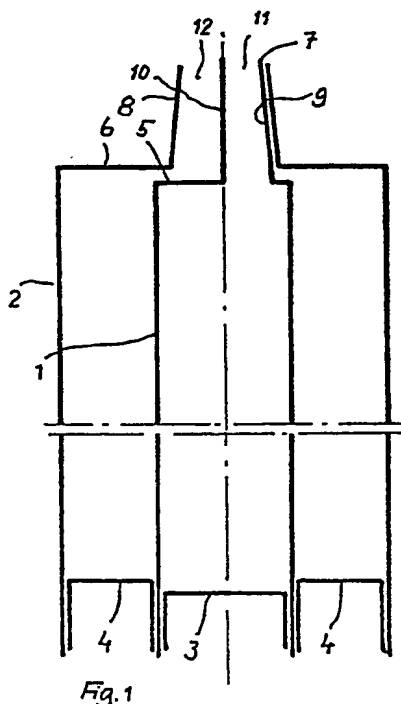
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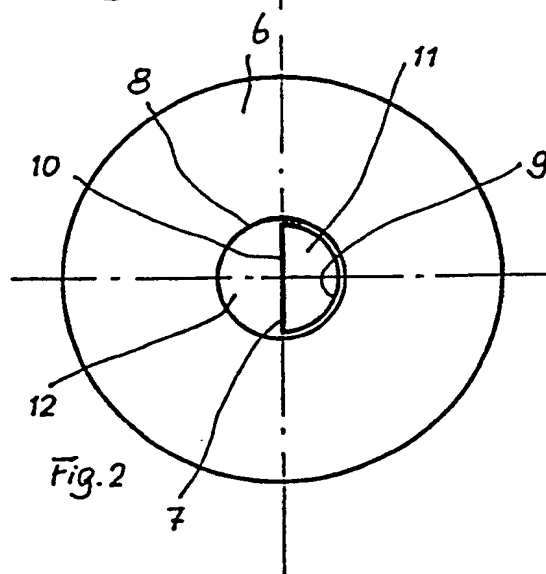
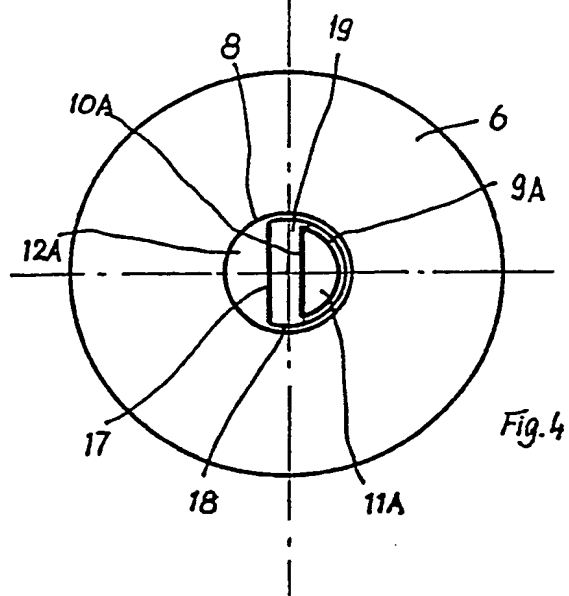
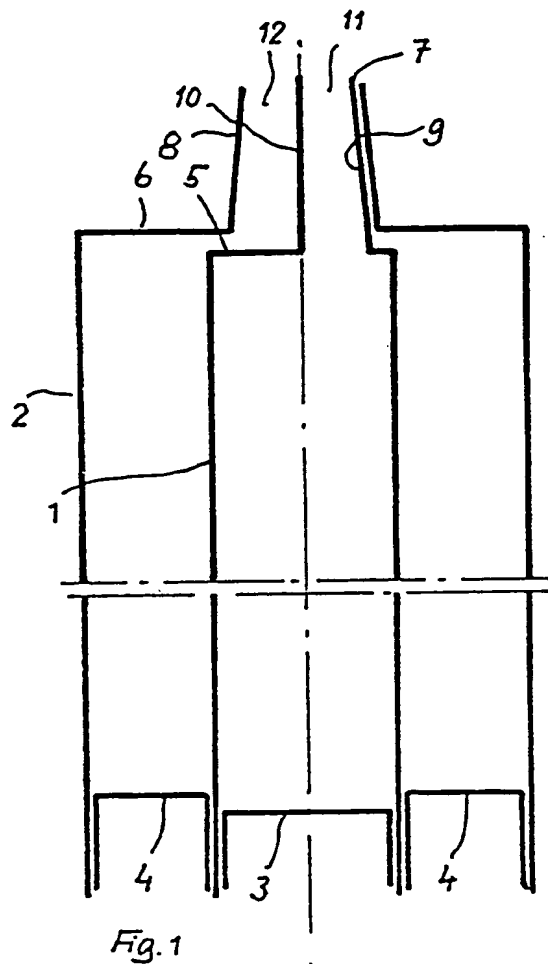
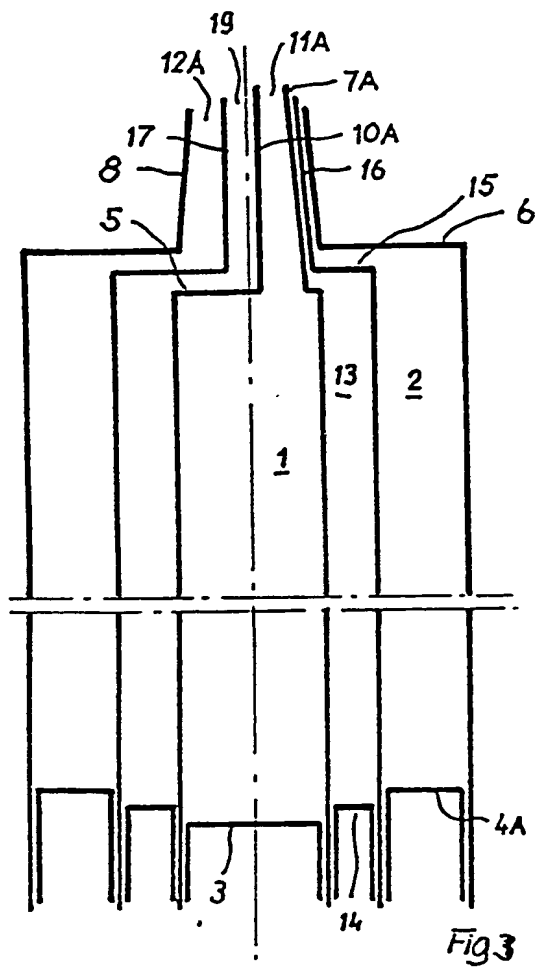
(58) Field of Search

UK CL (Edition M) B8D DCF8 DCF9 DSC2 DSR1 DSR2
DSSINT CL⁵ B65D 25/40 25/42 35/22 35/38 81/32 83/00
on-line databases ; w.p.l.**(54) Multi-chambered cartridge**

(57) A cartridge has at least two concentric chambers 1, 2 and each chamber has a spout 8, 9 with an outlet opening 11, 12, one spout being located within the other and the outlet openings which are adjacent each other being separated by a chordal wall 10, 17 provided on the spout of the inner chamber and located within the spout of the outer chamber. The cross-sectional shape of the inner spout is a segment of a circle, the curved part 9A of which engages the inner wall of the spout surrounding it. A spacer rib at right angles K the chordal wall may be provided on the inner spout (20, Figure 5) and spacer studs may be moulded onto the shoulders of the inner chamber (21, Figure 5). An ejector plate in the form of a circular plate and an outer annular plate may be provided (30, 31 Figure 11). The outer spout may be conical and provided with an external thread (Figure 8).



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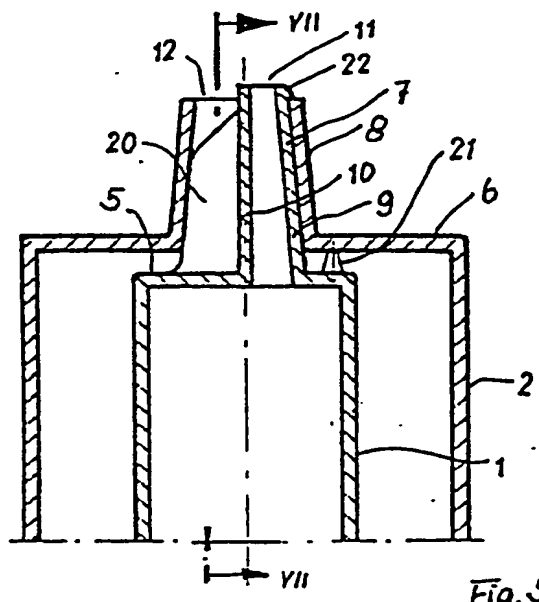


Fig. 5

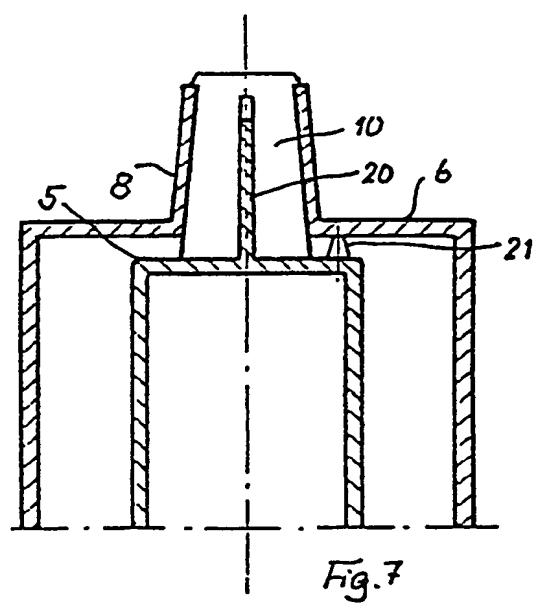


Fig. 7

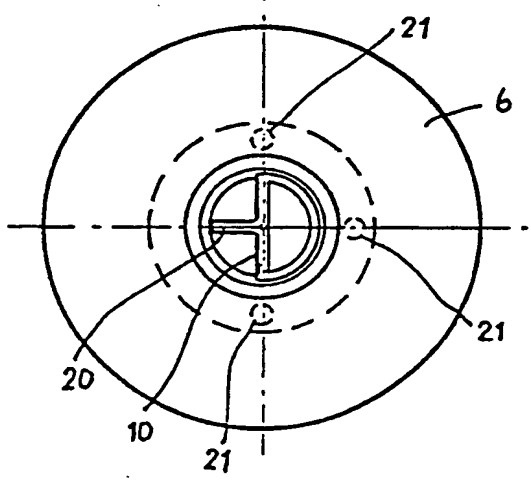


Fig. 6

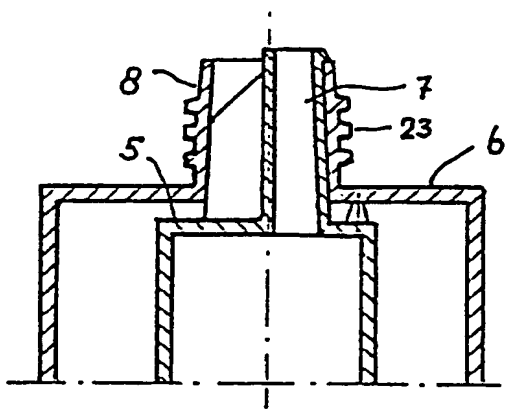
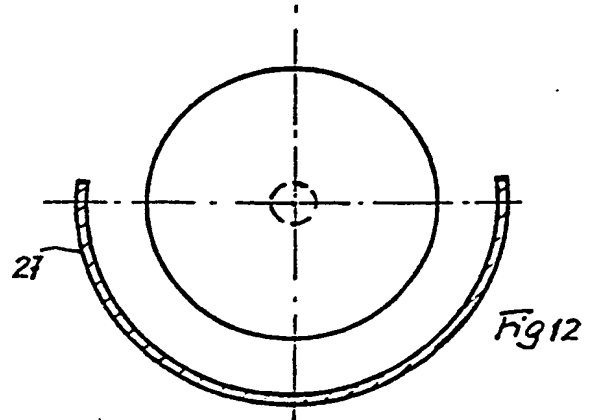
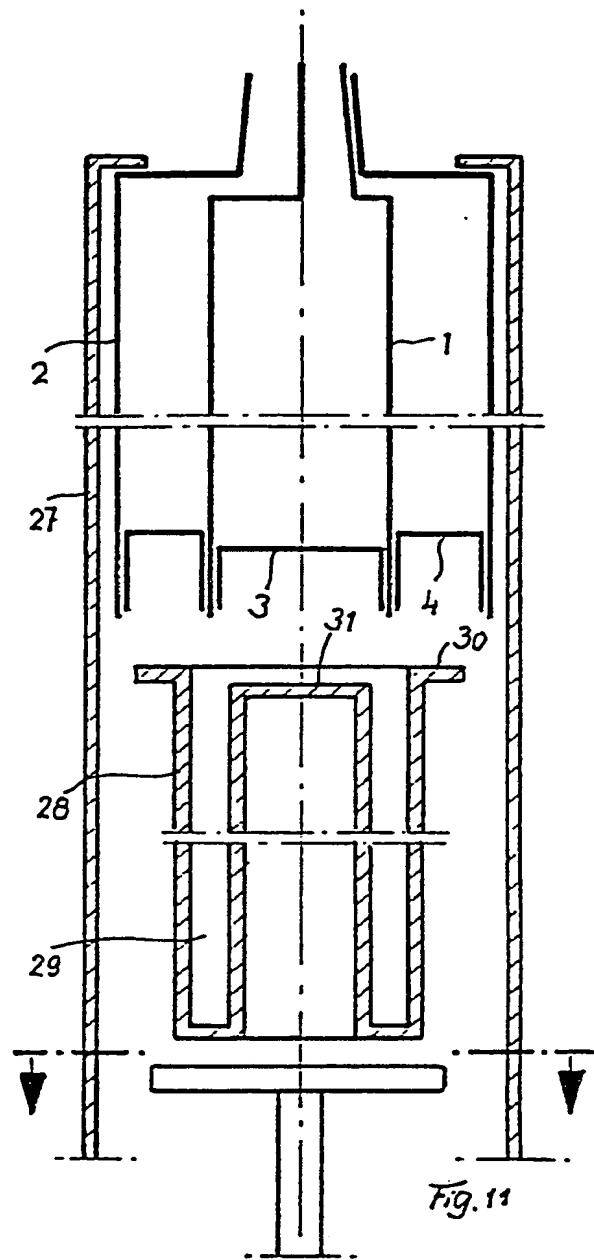
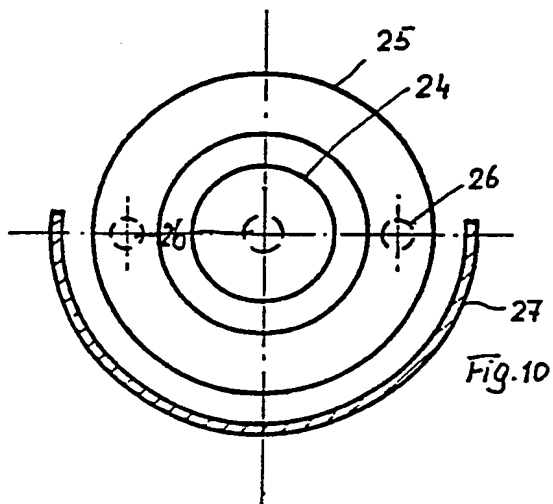
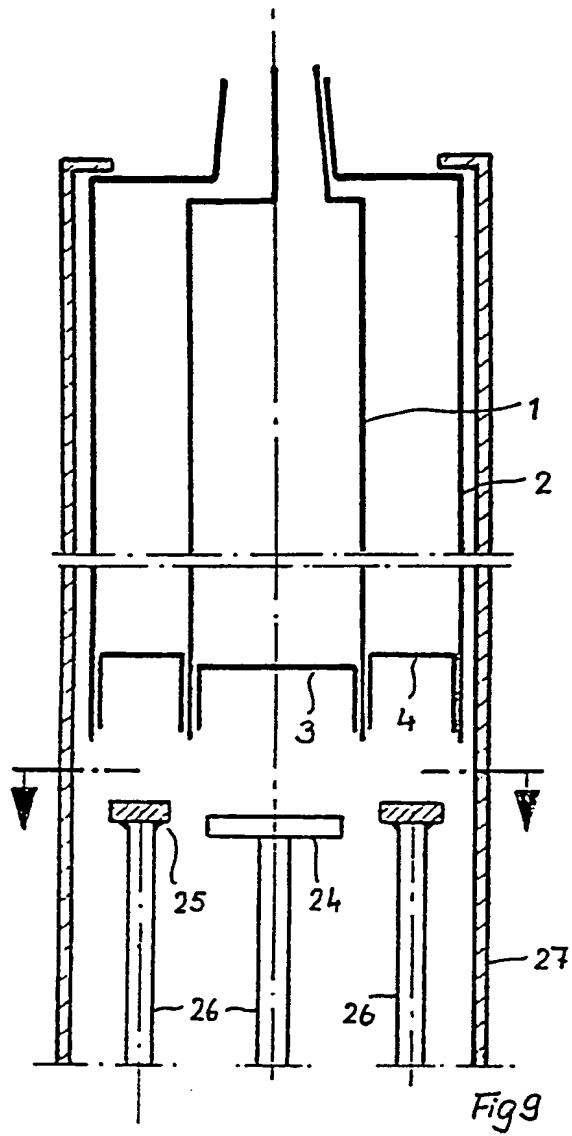


Fig. 8



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CARTRIDGE CHARGE

This invention relates to a cartridge charge of the type comprising two or more concentric chambers, each chamber having a spout for the delivery of the compositions provided in the chambers, one spout being located within the other. Such a cartridge charge can be used, for example, with an adhesive.

It is known to manufacture cartridge cases of the type set forth above in which the chamber walls are all in one piece. With this arrangement the spout of the cartridge charge is usually arranged eccentrically to the outer chamber and the wall of the inner chamber extends through the spout to provide the spout for the inner chamber. The cross-section of the outlet opening in the spout from the outer chamber is of half-moon shape whilst the cross-section of the outlet opening from the inner chamber is a roughly elliptical shape. The compositions in the chambers leave the spout running in parallel with one another and are discharged from the cartridge charge into a static spiral mixer which ensures thorough mixing of the compositions.

The materials are discharged from the chambers by axially movable pistons.

One disadvantage of this one piece form of construction is the bevels on the inner tubular walls at the end of the moulding which are necessary in injection moulding technology. The tubular walls become thicker in the direction of the outlet openings which, during ejection of the cartridge charge, causes a relatively heavy deformation of the piston sealing lips. This causes very high forces of ejection.

In another form of cartridge charge of this type the chambers consist of individual tubes the ends of which are closed by end walls which form shoulders and from which the discharge spout extends. The individual tubes are snapped together at the shoulders but the rest of the construction is similar to that described above with regard to the one piece construction. When the chambers are made from individual tubes there is the advantage that the walls have a homogeneous thickness along their whole length. The disadvantage however is that if there is the smallest manufacturing error the sealing between the chambers is no longer guaranteed and leads to leakage of composition from one chamber to another and hence to an unintentional mixing of the compositions in the region of the shoulder of the charge.

In yet another form of construction each chamber has a separate spout and these are located one within the other. The inner chamber has an outlet opening at the end of its spout of circular cross-section which is surrounded by an annular outlet opening from the outer chamber. This leads to the compositions from the chambers leaving the spouts concentrically with one another and they tend to be poorly mixed in the firing spiral mixer.

According to the present invention a cartridge charge has at least two concentric chambers, each chamber having a spout with an outlet opening one spout being located within the other and in which the said outlet openings which are adjacent each other are separated by a chordal wall provided on the spout of the inner chamber and which is located within the spout of the outer chamber, the cross-sectional shape of the inner spout being a segment of a circle and the curved part of which engages the inner wall of the spout surrounding it.

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The invention can be performed in various ways and some embodiments will now be described by way of example and with reference to the accompanying drawings in which :

Figure 1 is a diagrammatic cross-sectional front elevation of a cartridge charge according to the invention and which has two chambers;

Figure 2 is a plan view of the cartridge charge shown in Figure 1;

Figure 3 is a diagrammatic cross-sectional front elevation of a cartridge charge according to the invention which has three chambers;

Figure 4 is a plan view of the cartridge charge shown in Figure 3;

Figure 5 is a cross-sectional front elevation of the head of a cartridge charge which has two chambers;

Figure 6 is a plan view of the cartridge charge shown in Figure 5;

Figure 7 is a cross-sectional view on the line VII-VII of Figure 5;

Figure 8 is a cross-sectional view, similar to Figure 5, of an alternative construction;

Figure 9 is a diagrammatic cross-section through a two-chambered cartridge charge showing the ejector plates of the ejector pistol;

Figure 10 is a plan view of the ejector plates shown in Figure 9;

Figure 11 is a diagrammatic cross section through a two-chambered cartridge charge with a plunger; and,

Figure 12 is a plan view of the ejector plate of a commercial ejector piston;

As shown in Figures 1 and 2 a cartridge charge according to the invention comprises an inner chamber 1 and an outer chamber 2 into which the inner chamber 1 is inserted. Both chambers 1 and 2 have circular cylindrical chamber walls. Thus the inner chamber space is of circular cross-section and the outer chamber space is of annular cross-section. At the rear the inner chamber 1 is closed by a circular cylindrical ejection piston 3 and the outer chamber 2 by an annular ejection piston 4. The inner chamber 1 has a front shoulder 5 which is located at a distance from a shoulder 6 on the outer chamber 2. Each chamber, starting from the shoulder 5, or 6, has a spout 7, 8. The spout 8 of the outer chamber 2 is conical and has a circular cross-section. The spout 7 of the inner chamber 1 is semicircular and has a semicircular wall 9 and a chordal wall 10. The semicircular wall 9 rests against the inner wall of the outer spout 8. Thus two semicircular outlet openings 11, 12 are formed for the inner and outer chambers 1, 2.

Figures 3 and 4 show a three-chambered cartridge charge and the same reference numbers are used to indicate similar parts as in Figures 1 and 2. The outer chamber 2 with its shoulder 6 and spout 8 is of the same construction as in the embodiment shown in Figures 1 and 2. Into this outer chamber is inserted a middle chamber 13 into which an

inner chamber 1 is inserted. At the rear the inner chamber 1 is closed by a circular cylindrical ejection piston 3, the middle chamber by an annular ejection piston 14 and the outer chamber by an annular ejection piston 4A. The shoulder 5 of the inner chamber 1 is located at a distance from the shoulder 15 of the middle chamber which again is located at a distance from the shoulder 6 of the outer chamber 2. The inner chamber 1 has a spout 7A and the middle chamber a spout 16A. The spout 7A has a cross-section the shape of a segment of a circle, smaller than a semicircle, consisting of a chordal wall 10A and a wall 9A the shape of a circular arc. The middle spout has a cross-section the shape of a segment of a circle larger than a semicircle, comprising a chordal wall 17 which is in parallel with the wall 10A, and a wall 18 the shape of a circular arc. Thus three outlet openings 11A, 19 and 12A are formed. The outlet openings 11A and 12A have a cross-section the shape of a segment of a circle and the outlet opening 19 is of substantially rectangular cross-section.

Figures 5 to 7 show a convenient form of two-chamber construction. A spacer rib 20 is moulded onto the wall 10 at right angles thereto. This rib extends across the outlet opening 12 and rests against the inner wall of the spout 8 as is most clearly shown in Figures 5 and 6. The spout 8 is conical. Studs 21 are moulded onto the shoulder 5 of the inner chamber 1 as spacers. The wall 9 which is in the shape of a circular arc is provided with a detent 22 which is moulded into the outer end. When the inner chamber 1 is inserted into the chamber 2 the spacer rib 20 and the wall 9 which is in the shape of a circular arc come into contact with the inner wall of the spout 8, the studs 21 butt against the inner wall of the shoulder 6 and the detent 22 engages over the outer edge of the outer spout 8. The shoulder 5 is thereby located and held at a distance from

the shoulder 6.

The connection at the head between the chambers 1 and 2 as described above for a two chamber construction may be provided in the same way between the chambers 1 and 13 and the chambers 13 and 2 of the three chamber construction shown in Figures 3 and 4.

The spout 8 is made conical for mounting a spiral mixer. Alternatively it may be made cylindrical and have an outer thread 23 as shown in Figure 8.

Figures 9 and 10 show how a circular ejector plate 24 and an annular ejector plate 25 can be provided to force the ejector pistons 3 and 4 forwards. The plates are carried respectively by a set of rods 26. The ejector plates 24, 25 are located so that they come into contact with the pistons 3, 4 when the rods are operated. An ejector pistol casing 27 surrounds the rods and plates as shown in Figures 9 and 10.

As shown in Figures 11 and 12 the ejector plates 24, 25 with the set of rods 26 are replaced by a ejector plunger 28 which has an annular incision 29 for the wall of the chamber 1. In this case the annular flange 30 comes into contact with the piston 4, whilst the central portion part 31 comes into contact with the piston 3.

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CLAIMS

1. A cartridge charge having at least two concentric chambers, each chamber having a spout with an outlet opening one spout being located within the other and in which the said outlet openings which are adjacent each other are separated by a chordal wall provided on the spout of the inner chamber and which is located within the spout of the outer chamber, the cross-sectional shape of the inner spout being a segment of a circle and the curved part of which engages the inner wall of the spout surrounding it.
2. A cartridge charge as claimed in claim 1 in which two concentric chambers are provided the chordal wall separating from one another two substantially semicircular outlet openings.
3. A cartridge charge as claimed in claim 1 in which three concentric chambers are provided each having a spout the wall of the innermost spout defining an outlet opening in the shape of a segment of a circle and the wall of the middle spout being substantially parallel with the said wall of the innermost spout.
4. A cartridge charge as claimed in any one of preceding claims 1 to 3 in which a spacer rib substantially at right angles to the adjacent chordal wall is provided which extends across the outlet opening of the outer spout.
5. A cartridge charge as claimed in claim 4 in which the spacer rib is integral with said adjacent chordal wall.
6. A cartridge charge as claimed in claim 4 or claim 5 in which a detent is provided at the outer end of the inner spout which extends from the outer edge of the curved

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portion thereof and engages over the outer edge of the adjacent outer spout.

7. A cartridge charge as claimed in any one of preceding claims 1 to 6 in which spacer means are provided between the outer ends of adjacent chambers.

8. A cartridge charge as claimed in claim 7 in which the ends of the chambers are provided as shoulders and the spout means are in the form of spacer studs.

9. A cartridge charge as claimed in claim 8 in which the spacer studs are moulded onto the shoulder of the innermost chamber of each pair of chambers to be spaced apart.

10. A cartridge charge as claimed in any one of preceding claims 1 to 9 in which one circular and at least one annular ejector plate are provided which are carried by operating rods and which act on ejection pistons located in the chambers.

11. A cartridge charge as claimed in any one of preceding claims 1 to 9 in which an ejection plunger is provided which has a circular incision for an inner chamber wall and which acts on ejection pistons located in the chambers.

12. A cartridge charge as claimed in any one of preceding claims 1 to 11 in which the outer spout is substantially conical.

13. A cartridge charge as claimed in any one of preceding claims 1 to 11 in which the outer spout is provided with an external thread.

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14. A cartridge charge substantially as described herein with reference to and as shown in Figures 1 and 2, Figures 3 and 4, Figures 5, 6 and 7, Figure 8, Figures 9 and 10, and Figures 11 and 12 of the accompanying drawings.

Patents Act 1977**Examiner's report to the Comptroller under Section 17 - 10 -**
(Main Search report)Application number
GB 9405557.1**Relevant Technical Fields**

(i) UK Cl (Ed.M) B8D DSC2, DSR1, DRS2, DSS, DCF8, DCF9

(ii) Int Cl (Ed.5) B65D 81/32, 83/00, 25/40, 25/42, 35/22,
35/38Search Examiner
LINDA HARDENDate of completion of Search
1 JUNE 1994**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES; WPI

Documents considered relevant
following a search in respect of
Claims :-
1-14**Categories of documents**

- X:** Document indicating lack of novelty or of inventive step. **P:** Document published on or after the declared priority date but before the filing date of the present application.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category. **E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A:** Document indicating technological background and/or state of the art. **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
Y	GB 1506442	(PROCTER & GAMBLE) see Figures 6-9	13
X,Y	GB 1385924	(UMPVENESTA LTD) see Figure 4 and page 2 lines 45-51	X: 1, 2 Y: 13

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).